

WHAT IS CLAIMED IS:

1. A preamble for a wireless communications system, the preamble comprising a sequence wherein the sequence comprises a concatenation of a first set of sub-sequences, with each sub-sequence containing a specified number of zeroes, and wherein each sub-sequence can differ depending upon its position in the preamble.
2. The preamble of claim 1, wherein the sub-sequences may be specified in the time domain.
3. The preamble of claim 1 further comprising a second sequence wherein the second sequence comprises a concatenation of a second set of sub-sequences, wherein the second set of sub-sequences can differ from the first set of sub-sequences.
4. The preamble of claim 3, wherein the second sequence comprises a concatenation of multiple copies of a frequency domain sequence.
5. The preamble of claim 4, wherein the frequency domain sequence is converted into a time domain sequence prior to use in creating the second sequence.
6. The preamble of claim 5, wherein the second sequence comprises six (6) copies of the time domain sequence version of the frequency domain sequence.
7. The preamble of claim 4, wherein the frequency domain sequence is specified as follows:

Tone Number	Value	Tone Number	Value	Tone Number	Value	Tone Number	Value
-56	$(1-j)/\sqrt{2}$	-28	$(1-j)/\sqrt{2}$	1	$(1+j)/\sqrt{2}$	29	$(1+j)/\sqrt{2}$
-55	$(-1+j)/\sqrt{2}$	-27	$(1-j)/\sqrt{2}$	2	$-(1+j)/\sqrt{2}$	30	$-(1+j)/\sqrt{2}$
-54	$(-1+j)/\sqrt{2}$	-26	$(-1+j)/\sqrt{2}$	3	$(1+j)/\sqrt{2}$	31	$-(1+j)/\sqrt{2}$

-53	$(1-j)/\sqrt{2}$	-25	$(-1+j)/\sqrt{2}$	4	$-(1+j)/\sqrt{2}$	32	$(1+j)/\sqrt{2}$
-52	$(1-j)/\sqrt{2}$	-24	$(-1+j)/\sqrt{2}$	5	$-(1+j)/\sqrt{2}$	33	$-(1+j)/\sqrt{2}$
-51	$(1-j)/\sqrt{2}$	-23	$(1-j)/\sqrt{2}$	6	$-(1+j)/\sqrt{2}$	34	$-(1+j)/\sqrt{2}$
-50	$(-1+j)/\sqrt{2}$	-22	$(-1+j)/\sqrt{2}$	7	$-(1+j)/\sqrt{2}$	35	$-(1+j)/\sqrt{2}$
-49	$(1-j)/\sqrt{2}$	-21	$(-1+j)/\sqrt{2}$	8	$-(1+j)/\sqrt{2}$	36	$(1+j)/\sqrt{2}$
-48	$(-1+j)/\sqrt{2}$	-20	$(1-j)/\sqrt{2}$	9	$(1+j)/\sqrt{2}$	37	$-(1+j)/\sqrt{2}$
-47	$(-1+j)/\sqrt{2}$	-19	$(-1+j)/\sqrt{2}$	10	$(1+j)/\sqrt{2}$	38	$(1+j)/\sqrt{2}$
-46	$(-1+j)/\sqrt{2}$	-18	$(-1+j)/\sqrt{2}$	11	$(1+j)/\sqrt{2}$	39	$-(1+j)/\sqrt{2}$
-45	$(1-j)/\sqrt{2}$	-17	$(-1+j)/\sqrt{2}$	12	$-(1+j)/\sqrt{2}$	40	$-(1+j)/\sqrt{2}$
-44	$(-1+j)/\sqrt{2}$	-16	$(-1+j)/\sqrt{2}$	13	$(1+j)/\sqrt{2}$	41	$-(1+j)/\sqrt{2}$
-43	$(-1+j)/\sqrt{2}$	-15	$(1-j)/\sqrt{2}$	14	$-(1+j)/\sqrt{2}$	42	$-(1+j)/\sqrt{2}$
-42	$(-1+j)/\sqrt{2}$	-14	$(-1+j)/\sqrt{2}$	15	$(1+j)/\sqrt{2}$	43	$-(1+j)/\sqrt{2}$
-41	$(-1+j)/\sqrt{2}$	-13	$(1-j)/\sqrt{2}$	16	$-(1+j)/\sqrt{2}$	44	$-(1+j)/\sqrt{2}$
-40	$(-1+j)/\sqrt{2}$	-12	$(-1+j)/\sqrt{2}$	17	$-(1+j)/\sqrt{2}$	45	$(1+j)/\sqrt{2}$
-39	$(-1+j)/\sqrt{2}$	-11	$(1-j)/\sqrt{2}$	18	$-(1+j)/\sqrt{2}$	46	$-(1+j)/\sqrt{2}$
-38	$(1-j)/\sqrt{2}$	-10	$(1-j)/\sqrt{2}$	19	$-(1+j)/\sqrt{2}$	47	$-(1+j)/\sqrt{2}$
-37	$(-1+j)/\sqrt{2}$	-9	$(1-j)/\sqrt{2}$	20	$(1+j)/\sqrt{2}$	48	$-(1+j)/\sqrt{2}$
-36	$(1-j)/\sqrt{2}$	-8	$(-1+j)/\sqrt{2}$	21	$-(1+j)/\sqrt{2}$	49	$(1+j)/\sqrt{2}$
-35	$(-1+j)/\sqrt{2}$	-7	$(-1+j)/\sqrt{2}$	22	$-(1+j)/\sqrt{2}$	50	$-(1+j)/\sqrt{2}$
-34	$(-1+j)/\sqrt{2}$	-6	$(-1+j)/\sqrt{2}$	23	$(1+j)/\sqrt{2}$	51	$(1+j)/\sqrt{2}$
-33	$(-1+j)/\sqrt{2}$	-5	$(-1+j)/\sqrt{2}$	24	$-(1+j)/\sqrt{2}$	52	$(1+j)/\sqrt{2}$
-32	$(1-j)/\sqrt{2}$	-4	$(-1+j)/\sqrt{2}$	25	$-(1+j)/\sqrt{2}$	53	$(1+j)/\sqrt{2}$
-31	$(-1+j)/\sqrt{2}$	-3	$(1-j)/\sqrt{2}$	26	$-(1+j)/\sqrt{2}$	54	$-(1+j)/\sqrt{2}$
-30	$(-1+j)/\sqrt{2}$	-2	$(-1+j)/\sqrt{2}$	27	$(1+j)/\sqrt{2}$	55	$-(1+j)/\sqrt{2}$
-29	$(1-j)/\sqrt{2}$	-1	$(1-j)/\sqrt{2}$	28	$(1+j)/\sqrt{2}$	56	$(1+j)/\sqrt{2}$

8. The preamble of claim 4, wherein the frequency domain sequence is specified as follows:

Tone Number	Value	Tone Number	Value	Tone Number	Value	Tone Number	Value
-56	1	-28	1	1	1	29	1
-55	-1	-27	-1	2	1	30	1
-54	-1	-26	1	3	1	31	1
-53	1	-25	1	4	1	32	1
-52	-1	-24	1	5	1	33	-1

-51	-1	-23	-1	6	-1	34	-1
-50	1	-22	1	7	-1	35	-1
-49	1	-21	-1	8	1	36	1
-48	-1	-20	1	9	1	37	-1
-47	1	-19	-1	10	1	38	-1
-46	-1	-18	-1	11	-1	39	-1
-45	-1	-17	1	12	1	40	1
-44	-1	-16	-1	13	1	41	1
-43	1	-15	-1	14	-1	42	-1
-42	-1	-14	-1	15	-1	43	1
-41	1	-13	1	16	-1	44	-1
-40	1	-12	1	17	1	45	-1
-39	-1	-11	-1	18	-1	46	-1
-38	-1	-10	1	19	-1	47	1
-37	-1	-9	1	20	1	48	-1
-36	1	-8	1	21	-1	49	1
-35	-1	-7	-1	22	1	50	1
-34	-1	-6	-1	23	-1	51	-1
-33	-1	-5	1	24	1	52	-1
-32	1	-4	1	25	1	53	1
-31	1	-3	1	26	1	54	-1
-30	1	-2	1	27	-1	55	-1
-29	1	-1	1	28	1	56	1

9. The preamble of claim 1, wherein the first sequence comprises:
a third sequence wherein the third sequence comprises a concatenation of multiple copies of a first sub-sequence; and
a fourth sequence wherein the fourth sequence comprises a concatenation of multiple copies of a fifth sequence comprising 180-degree rotations of each member of the first sub-sequence.
10. The preamble of claim 9, wherein the first sub-sequence is a hierarchical sequence.
11. The preamble of claim 10, wherein the first sub-sequence is created by spreading a first hierarchical sequence with a second hierarchical sequence, wherein the two hierarchical sequences are shorter than the first sub-sequence.

12. The preamble of claim 11, wherein the first hierarchical sequence is a sequence selected from:

Sequence																
#1	1	1	1	1	-1	-1	1	1	-1	-1	1	-1	1	-1	1	1
#2	1	-1	-1	-1	-1	-1	1	-1	1	-1	-1	1	1	-1	-1	1
#3	1	1	-1	-1	-1	1	-1	-1	-1	1	-1	-1	1	-1	1	1
#4	1	-1	-1	1	-1	1	-1	-1	1	1	-1	-1	-1	-1	-1	1

13. The preamble of claim 11, wherein the second hierarchical sequence is a sequence selected from:

Sequence								
#1	1	-1	-1	-1	1	1	-1	1
#2	1	-1	1	1	-1	-1	-1	1
#3	1	1	-1	1	1	-1	-1	-1
#4	1	1	1	-1	-1	1	-1	-1

14. The preamble of claim 11, wherein the time domain sequence is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	1	C ₃₂	-1	C ₆₄	-1	C ₉₆	1
C ₁	-1	C ₃₃	1	C ₆₅	1	C ₉₇	-1
C ₂	-1	C ₃₄	1	C ₆₆	1	C ₉₈	-1
C ₃	-1	C ₃₅	1	C ₆₇	1	C ₉₉	-1
C ₄	1	C ₃₆	-1	C ₆₈	-1	C ₁₀₀	1
C ₅	1	C ₃₇	-1	C ₆₉	-1	C ₁₀₁	1
C ₆	-1	C ₃₈	1	C ₇₀	1	C ₁₀₂	-1
C ₇	1	C ₃₉	-1	C ₇₁	-1	C ₁₀₃	1
C ₈	1	C ₄₀	-1	C ₇₂	-1	C ₁₀₄	-1
C ₉	-1	C ₄₁	1	C ₇₃	1	C ₁₀₅	1
C ₁₀	-1	C ₄₂	1	C ₇₄	1	C ₁₀₆	1
C ₁₁	-1	C ₄₃	1	C ₇₅	1	C ₁₀₇	1
C ₁₂	1	C ₄₄	-1	C ₇₆	-1	C ₁₀₈	-1
C ₁₃	1	C ₄₅	-1	C ₇₇	-1	C ₁₀₉	-1
C ₁₄	-1	C ₄₆	1	C ₇₈	1	C ₁₁₀	1
C ₁₅	1	C ₄₇	-1	C ₇₉	-1	C ₁₁₁	-1
C ₁₆	1	C ₄₈	1	C ₈₀	1	C ₁₁₂	1
C ₁₇	-1	C ₄₉	-1	C ₈₁	-1	C ₁₁₃	-1

C ₁₈	-1	C ₅₀	-1	C ₈₂	-1	C ₁₁₄	-1
C ₁₉	-1	C ₅₁	-1	C ₈₃	-1	C ₁₁₅	-1
C ₂₀	1	C ₅₂	1	C ₈₄	1	C ₁₁₆	1
C ₂₁	1	C ₅₃	1	C ₈₅	1	C ₁₁₇	1
C ₂₂	-1	C ₅₄	-1	C ₈₆	-1	C ₁₁₈	-1
C ₂₃	1	C ₅₅	1	C ₈₇	1	C ₁₁₉	1
C ₂₄	1	C ₅₆	1	C ₈₈	-1	C ₁₂₀	1
C ₂₅	-1	C ₅₇	-1	C ₈₉	1	C ₁₂₁	-1
C ₂₆	-1	C ₅₈	-1	C ₉₀	1	C ₁₂₂	-1
C ₂₇	-1	C ₅₉	-1	C ₉₁	1	C ₁₂₃	-1
C ₂₈	1	C ₆₀	1	C ₉₂	-1	C ₁₂₄	1
C ₂₉	1	C ₆₁	1	C ₉₃	-1	C ₁₂₅	1
C ₃₀	-1	C ₆₂	-1	C ₉₄	1	C ₁₂₆	-1
C ₃₁	1	C ₆₃	1	C ₉₅	-1	C ₁₂₇	1

15. The preamble of claim 11, wherein the time domain sequence is specified as follows:

Sequence Elément	Value	Sequence Elément	Value	Sequence Element	Value	Sequence Elément	Value
C ₀	1	C ₃₂	-1	C ₆₄	1	C ₉₆	1
C ₁	-1	C ₃₃	1	C ₆₅	-1	C ₉₇	-1
C ₂	1	C ₃₄	-1	C ₆₆	1	C ₉₈	1
C ₃	1	C ₃₅	-1	C ₆₇	1	C ₉₉	1
C ₄	-1	C ₃₆	1	C ₆₈	-1	C ₁₀₀	-1
C ₅	-1	C ₃₇	1	C ₆₉	-1	C ₁₀₁	-1
C ₆	-1	C ₃₈	1	C ₇₀	-1	C ₁₀₂	-1
C ₇	1	C ₃₉	-1	C ₇₁	1	C ₁₀₃	1
C ₈	-1	C ₄₀	-1	C ₇₂	-1	C ₁₀₄	-1
C ₉	1	C ₄₁	1	C ₇₃	1	C ₁₀₅	1
C ₁₀	-1	C ₄₂	-1	C ₇₄	-1	C ₁₀₆	-1
C ₁₁	-1	C ₄₃	-1	C ₇₅	-1	C ₁₀₇	-1
C ₁₂	1	C ₄₄	1	C ₇₆	1	C ₁₀₈	1
C ₁₃	1	C ₄₅	1	C ₇₇	1	C ₁₀₉	1
C ₁₄	1	C ₄₆	1	C ₇₈	-1	C ₁₁₀	1
C ₁₅	-1	C ₄₇	-1	C ₇₉	-1	C ₁₁₁	-1
C ₁₆	-1	C ₄₈	1	C ₈₀	-1	C ₁₁₂	-1
C ₁₇	1	C ₄₉	-1	C ₈₁	1	C ₁₁₃	1
C ₁₈	-1	C ₅₀	1	C ₈₂	-1	C ₁₁₄	-1
C ₁₉	-1	C ₅₁	1	C ₈₃	-1	C ₁₁₅	-1
C ₂₀	1	C ₅₂	-1	C ₈₄	1	C ₁₁₆	1
C ₂₁	1	C ₅₃	-1	C ₈₅	1	C ₁₁₇	1
C ₂₂	1	C ₅₄	-1	C ₈₆	1	C ₁₁₈	1
C ₂₃	-1	C ₅₅	1	C ₈₇	-1	C ₁₁₉	-1
C ₂₄	-1	C ₅₆	-1	C ₈₈	1	C ₁₂₀	1

C ₂₅	1	C ₅₇	1	C ₈₉	-1	C ₁₂₁	-1
C ₂₆	-1	C ₅₈	-1	C ₉₀	1	C ₁₂₂	1
C ₂₇	-1	C ₅₉	-1	C ₉₁	1	C ₁₂₃	1
C ₂₈	1	C ₆₀	1	C ₉₂	-1	C ₁₂₄	-1
C ₂₉	1	C ₆₁	1	C ₉₃	-1	C ₁₂₅	-1
C ₃₀	1	C ₆₂	1	C ₉₄	-1	C ₁₂₆	-1
C ₃₁	-1	C ₆₃	-1	C ₉₅	1	C ₁₂₇	1

16. The preamble of claim 11, wherein the time domain sequence is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	1	C ₃₂	-1	C ₆₄	-1	C ₉₆	1
C ₁	1	C ₃₃	-1	C ₆₅	-1	C ₉₇	1
C ₂	-1	C ₃₄	1	C ₆₆	1	C ₉₈	-1
C ₃	1	C ₃₅	-1	C ₆₇	-1	C ₉₉	1
C ₄	1	C ₃₆	-1	C ₆₈	-1	C ₁₀₀	1
C ₅	-1	C ₃₇	-1	C ₆₉	1	C ₁₀₁	-1
C ₆	-1	C ₃₈	1	C ₇₀	1	C ₁₀₂	-1
C ₇	-1	C ₃₉	1	C ₇₁	1	C ₁₀₃	-1
C ₈	1	C ₄₀	1	C ₇₂	1	C ₁₀₄	-1
C ₉	1	C ₄₁	1	C ₇₃	1	C ₁₀₅	-1
C ₁₀	-1	C ₄₂	-1	C ₇₄	-1	C ₁₀₆	1
C ₁₁	1	C ₄₃	1	C ₇₅	1	C ₁₀₇	-1
C ₁₂	1	C ₄₄	1	C ₇₆	1	C ₁₀₈	-1
C ₁₃	-1	C ₄₅	-1	C ₇₇	-1	C ₁₀₉	1
C ₁₄	-1	C ₄₆	-1	C ₇₈	-1	C ₁₁₀	1
C ₁₅	-1	C ₄₇	-1	C ₇₉	-1	C ₁₁₁	1
C ₁₆	-1	C ₄₈	-1	C ₈₀	-1	C ₁₁₂	1
C ₁₇	-1	C ₄₉	-1	C ₈₁	-1	C ₁₁₃	1
C ₁₈	1	C ₅₀	1	C ₈₂	1	C ₁₁₄	-1
C ₁₉	-1	C ₅₁	-1	C ₈₃	-1	C ₁₁₅	1
C ₂₀	-1	C ₅₂	-1	C ₈₄	-1	C ₁₁₆	1
C ₂₁	1	C ₅₃	1	C ₈₅	1	C ₁₁₇	-1
C ₂₂	1	C ₅₄	1	C ₈₆	1	C ₁₁₈	-1
C ₂₃	1	C ₅₅	1	C ₈₇	1	C ₁₁₉	-1
C ₂₄	-1	C ₅₆	-1	C ₈₈	-1	C ₁₂₀	1
C ₂₅	-1	C ₅₇	-1	C ₈₉	-1	C ₁₂₁	1
C ₂₆	1	C ₅₈	1	C ₉₀	1	C ₁₂₂	-1
C ₂₇	-1	C ₅₉	-1	C ₉₁	-1	C ₁₂₃	1
C ₂₈	-1	C ₆₀	-1	C ₉₂	-1	C ₁₂₄	1
C ₂₉	1	C ₆₁	1	C ₉₃	1	C ₁₂₅	-1
C ₃₀	1	C ₆₂	1	C ₉₄	1	C ₁₂₆	-1
C ₃₁	1	C ₆₃	1	C ₉₅	1	C ₁₂₇	-1

17. The preamble of claim 11, wherein the time domain sequence is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	1	C ₃₂	-1	C ₆₄	1	C ₉₆	-1
C ₁	1	C ₃₃	-1	C ₆₅	1	C ₉₇	-1
C ₂	1	C ₃₄	-1	C ₆₆	1	C ₉₈	-1
C ₃	-1	C ₃₅	1	C ₆₇	-1	C ₉₉	1
C ₄	-1	C ₃₆	1	C ₆₈	-1	C ₁₀₀	1
C ₅	1	C ₃₇	-1	C ₆₉	1	C ₁₀₁	-1
C ₆	-1	C ₃₈	1	C ₇₀	-1	C ₁₀₂	1
C ₇	-1	C ₃₉	1	C ₇₁	-1	C ₁₀₃	1
C ₈	-1	C ₄₀	1	C ₇₂	1	C ₁₀₄	-1
C ₉	-1	C ₄₁	1	C ₇₃	1	C ₁₀₅	-1
C ₁₀	-1	C ₄₂	1	C ₇₄	1	C ₁₀₆	-1
C ₁₁	1	C ₄₃	-1	C ₇₅	-1	C ₁₀₇	1
C ₁₂	1	C ₄₄	-1	C ₇₆	-1	C ₁₀₈	1
C ₁₃	-1	C ₄₅	1	C ₇₇	1	C ₁₀₉	-1
C ₁₄	1	C ₄₆	-1	C ₇₈	-1	C ₁₁₀	1
C ₁₅	1	C ₄₇	-1	C ₇₉	-1	C ₁₁₁	1
C ₁₆	-1	C ₄₈	-1	C ₈₀	-1	C ₁₁₂	-1
C ₁₇	-1	C ₄₉	-1	C ₈₁	-1	C ₁₁₃	-1
C ₁₈	-1	C ₅₀	-1	C ₈₂	-1	C ₁₁₄	-1
C ₁₉	1	C ₅₁	1	C ₈₃	1	C ₁₁₅	1
C ₂₀	1	C ₅₂	1	C ₈₄	1	C ₁₁₆	1
C ₂₁	-1	C ₅₃	-1	C ₈₅	-1	C ₁₁₇	-1
C ₂₂	1	C ₅₄	1	C ₈₆	1	C ₁₁₈	1
C ₂₃	1	C ₅₅	1	C ₈₇	1	C ₁₁₉	1
C ₂₄	1	C ₅₆	-1	C ₈₈	-1	C ₁₂₀	1
C ₂₅	1	C ₅₇	-1	C ₈₉	-1	C ₁₂₁	1
C ₂₆	1	C ₅₈	-1	C ₉₀	-1	C ₁₂₂	1
C ₂₇	-1	C ₅₉	1	C ₉₁	1	C ₁₂₃	-1
C ₂₈	-1	C ₆₀	1	C ₉₂	1	C ₁₂₄	-1
C ₂₉	1	C ₆₁	-1	C ₉₃	-1	C ₁₂₅	1
C ₃₀	-1	C ₆₂	1	C ₉₄	1	C ₁₂₆	-1
C ₃₁	-1	C ₆₃	1	C ₉₅	1	C ₁₂₇	-1

18. The preamble of claim 9, wherein the third sequence comprises multiple copies of the first sub-sequence combined with a guard band.

19. The preamble of claim 18, wherein the third sequence comprises multiple copies of the first sub-sequence with a postpended guard band and a prepended sequence.
20. The preamble of claim 19, wherein the third sequence comprises twenty one (21) copies of the first sub-sequence with a postpended guard band and a prepended sequence.
21. The preamble of claim 19, wherein the third sequence comprises nine (9) copies of the first sub-sequence with a postpended guard band and a prepended sequence.
22. The preamble of claim 19, wherein the guard band comprises a sequence of five (5) zero samples.
23. The preamble of claim 19, wherein the prepended sequence is a zero-padded sequence.
24. The preamble of claim 19, wherein the prepended sequence is a cyclic prefix.
25. The preamble of claim 9, wherein the fourth sequence comprises multiple copies of the fifth sequence combined with a guard band.
26. The preamble of claim 25, wherein the fourth sequence comprises three (3) copies of the fifth sequence with a postpended guard band and a prepended sequence.
27. The preamble of claim 9, wherein the third sequence comprises multiple concatenated copies of the first sub-sequence, wherein the fourth sequence comprises multiple concatenated copies of the fifth sequence, and wherein the third and fourth sequences are interleaved.
28. The preamble of claim 27, wherein the preamble is used in a communications system that changes transmit frequency based on a transmit code, and wherein the length of the interleaved third and fourth sequence is an integer multiple of a period of the transmit code.

29. The preamble of claim 1, wherein the wireless communications system uses orthogonal frequency division multiple access.
30. The preamble of claim 29, wherein the wireless communications system is a time-frequency interleaved, orthogonal frequency division multiple access communications system.
31. The preamble of claim 1, wherein the preamble can be transformed prior to transmission.
32. The preamble of claim 31, wherein the transformation comprises a time-domain filtering.
33. The preamble of claim 31, wherein the transformation comprises:
a first domain conversion;
processing the domain converted preamble; and
a second domain conversion.
34. The preamble of claim 33, wherein the processing comprises magnitude clipping, and wherein the time domain sequence after the second domain conversion is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	0.6564	C ₃₂	-0.0844	C ₆₄	-0.2095	C ₉₆	0.4232
C ₁	-1.3671	C ₃₃	1.1974	C ₆₅	1.1640	C ₉₇	-1.2684
C ₂	-0.9958	C ₃₄	1.2261	C ₆₆	1.2334	C ₉₈	-1.8151
C ₃	-1.3981	C ₃₅	1.4401	C ₆₇	1.5338	C ₉₉	-1.4829
C ₄	0.8481	C ₃₆	-0.5988	C ₆₈	-0.8844	C ₁₀₀	1.0302
C ₅	1.0892	C ₃₇	-0.4675	C ₆₉	-0.3857	C ₁₀₁	0.9419
C ₆	-0.8621	C ₃₈	0.8520	C ₇₀	0.7730	C ₁₀₂	-1.1472
C ₇	1.1512	C ₃₉	-0.8922	C ₇₁	-0.9754	C ₁₀₃	1.4858
C ₈	0.9602	C ₄₀	-0.5603	C ₇₂	-0.2315	C ₁₀₄	-0.6794
C ₉	-1.3581	C ₄₁	1.1886	C ₇₃	0.5579	C ₁₀₅	0.9573
C ₁₀	-0.8354	C ₄₂	1.1128	C ₇₄	0.4035	C ₁₀₆	1.0807
C ₁₁	-1.3249	C ₄₃	1.0833	C ₇₅	0.4248	C ₁₀₇	1.1445
C ₁₂	1.0964	C ₄₄	-0.9073	C ₇₆	-0.3359	C ₁₀₈	-1.2312
C ₁₃	1.3334	C ₄₅	-1.6227	C ₇₇	-0.9914	C ₁₀₉	-0.6643
C ₁₄	-0.7378	C ₄₆	1.0013	C ₇₈	0.5975	C ₁₁₀	0.3836

C ₁₅	1.3565	C ₄₇	-1.6067	C ₇₉	-0.8408	C ₁₁₁	-1.1482
C ₁₆	0.9361	C ₄₈	0.3360	C ₈₀	0.3587	C ₁₁₂	-0.0353
C ₁₇	-0.8212	C ₄₉	-1.3136	C ₈₁	-0.9604	C ₁₁₃	-0.6747
C ₁₈	-0.2662	C ₅₀	-1.4448	C ₈₂	-1.0002	C ₁₁₄	-1.1653
C ₁₉	-0.6866	C ₅₁	-1.7238	C ₈₃	-1.1636	C ₁₁₅	-0.8896
C ₂₀	0.8437	C ₅₂	1.0287	C ₈₄	0.9590	C ₁₁₆	0.2414
C ₂₁	1.1237	C ₅₃	0.6100	C ₈₅	0.7137	C ₁₁₇	0.1160
C ₂₂	-0.3265	C ₅₄	-0.9237	C ₈₆	-0.6776	C ₁₁₈	-0.6987
C ₂₃	1.0511	C ₅₅	1.2618	C ₈₇	0.9824	C ₁₁₉	0.4781
C ₂₄	0.7927	C ₅₆	0.5974	C ₈₈	-0.5454	C ₁₂₀	0.1821
C ₂₅	-0.3363	C ₅₇	-1.0976	C ₈₉	1.1022	C ₁₂₁	-1.0672
C ₂₆	-0.1342	C ₅₈	-0.9776	C ₉₀	1.6485	C ₁₂₂	-0.9676
C ₂₇	-0.1546	C ₅₉	-0.9982	C ₉₁	1.3307	C ₁₂₃	-1.2321
C ₂₈	0.6955	C ₆₀	0.8967	C ₉₂	-1.2852	C ₁₂₄	0.5003
C ₂₉	1.0608	C ₆₁	1.7640	C ₉₃	-1.2659	C ₁₂₅	0.7419
C ₃₀	-0.1600	C ₆₂	-1.0211	C ₉₄	0.9435	C ₁₂₆	-0.8934
C ₃₁	0.9442	C ₆₃	1.6913	C ₉₅	-1.6809	C ₁₂₇	0.8391

35. The preamble of claim 33, wherein the processing comprises magnitude clipping, and wherein the time domain sequence after the second domain conversion is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	0.9679	C ₃₂	-1.2905	C ₆₄	1.5280	C ₉₆	0.5193
C ₁	-1.0186	C ₃₃	1.1040	C ₆₅	-0.9193	C ₉₇	-0.3439
C ₂	0.4883	C ₃₄	-1.2408	C ₆₆	1.1246	C ₉₈	0.1428
C ₃	0.5432	C ₃₅	-0.8062	C ₆₇	1.2622	C ₉₉	0.6251
C ₄	-1.4702	C ₃₆	1.5425	C ₆₈	-1.4406	C ₁₀₀	-1.0468
C ₅	-1.4507	C ₃₇	1.0955	C ₆₉	-1.4929	C ₁₀₁	-0.5798
C ₆	-1.1752	C ₃₈	1.4284	C ₇₀	-1.1508	C ₁₀₂	-0.8237
C ₇	-0.0730	C ₃₉	-0.4593	C ₇₁	0.4126	C ₁₀₃	0.2667
C ₈	-1.2445	C ₄₀	-1.0408	C ₇₂	-1.0462	C ₁₀₄	-0.9563
C ₉	0.3143	C ₄₁	1.0542	C ₇₃	0.7232	C ₁₀₅	0.6016
C ₁₀	-1.3951	C ₄₂	-0.4446	C ₇₄	-1.1574	C ₁₀₆	-0.9964
C ₁₁	-0.9694	C ₄₃	-0.7929	C ₇₅	-0.7102	C ₁₀₇	-0.3541
C ₁₂	0.4563	C ₄₄	1.6733	C ₇₆	0.8502	C ₁₀₈	0.3965
C ₁₃	0.3073	C ₄₅	1.7568	C ₇₇	0.6260	C ₁₀₉	0.5201
C ₁₄	0.6408	C ₄₆	1.3273	C ₇₈	0.9530	C ₁₁₀	0.4733
C ₁₅	-0.9798	C ₄₇	-0.2465	C ₇₉	-0.4971	C ₁₁₁	-0.2362
C ₁₆	-1.4116	C ₄₈	1.6850	C ₈₀	-0.8633	C ₁₁₂	-0.6892
C ₁₇	0.6038	C ₄₉	-0.7091	C ₈₁	0.6910	C ₁₁₃	0.4787
C ₁₈	-1.3860	C ₅₀	1.1396	C ₈₂	-0.3639	C ₁₁₄	-0.2605
C ₁₉	-1.0888	C ₅₁	1.5114	C ₈₃	-0.8874	C ₁₁₅	-0.5887

C ₂₀	1.1036	C ₅₂	-1.4343	C ₈₄	1.5311	C ₁₁₆	0.9411
C ₂₁	0.7067	C ₅₃	-1.5005	C ₈₅	1.1546	C ₁₁₇	0.7364
C ₂₂	1.1667	C ₅₄	-1.2572	C ₈₆	1.1935	C ₁₁₈	0.6714
C ₂₃	-1.0225	C ₅₅	0.8274	C ₈₇	-0.2930	C ₁₁₉	-0.1746
C ₂₄	-1.2471	C ₅₆	-1.5140	C ₈₈	1.3285	C ₁₂₀	1.1776
C ₂₅	0.7788	C ₅₇	1.1421	C ₈₉	-0.7231	C ₁₂₁	-0.8803
C ₂₆	-1.2716	C ₅₈	-1.0135	C ₉₀	1.2832	C ₁₂₂	1.2542
C ₂₇	-0.8745	C ₅₉	-1.0657	C ₉₁	0.7878	C ₁₂₃	0.5111
C ₂₈	1.2175	C ₆₀	1.4073	C ₉₂	-0.8095	C ₁₂₄	-0.8209
C ₂₉	0.8419	C ₆₁	1.8196	C ₉₃	-0.7463	C ₁₂₅	-0.8975
C ₃₀	1.2881	C ₆₂	1.1679	C ₉₄	-0.8973	C ₁₂₆	-0.9091
C ₃₁	-0.8210	C ₆₃	-0.4131	C ₉₅	0.5560	C ₁₂₇	0.2562

36. The preamble of claim 33, wherein the processing comprises magnitude clipping, and wherein the time domain sequence after the second domain conversion is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	0.4047	C ₃₂	-0.9671	C ₆₄	-0.7298	C ₉₆	0.2424
C ₁	0.5799	C ₃₃	-0.9819	C ₆₅	-0.9662	C ₉₇	0.5703
C ₂	-0.3407	C ₃₄	0.7980	C ₆₆	0.9694	C ₉₈	-0.6381
C ₃	0.4343	C ₃₅	-0.8158	C ₆₇	-0.8053	C ₉₉	0.7861
C ₄	0.0973	C ₃₆	-0.9188	C ₆₈	-0.9052	C ₁₀₀	0.9175
C ₅	-0.7637	C ₃₇	1.5146	C ₆₉	1.5933	C ₁₀₁	-0.4595
C ₆	-0.6181	C ₃₈	0.8138	C ₇₀	0.8418	C ₁₀₂	-0.2201
C ₇	-0.6539	C ₃₉	1.3773	C ₇₁	1.5363	C ₁₀₃	-0.7755
C ₈	0.3768	C ₄₀	0.2108	C ₇₂	0.3085	C ₁₀₄	-0.2965
C ₉	0.7241	C ₄₁	0.9245	C ₇₃	1.3016	C ₁₀₅	-1.1220
C ₁₀	-1.2095	C ₄₂	-1.2138	C ₇₄	-1.5546	C ₁₀₆	1.7152
C ₁₁	0.6027	C ₄₃	1.1252	C ₇₅	1.5347	C ₁₀₇	-1.2756
C ₁₂	0.4587	C ₄₄	0.9663	C ₇₆	1.0935	C ₁₀₈	-0.7731
C ₁₃	-1.3879	C ₄₅	-0.8418	C ₇₇	-0.8978	C ₁₀₉	1.0724
C ₁₄	-1.0592	C ₄₆	-0.6811	C ₇₈	-0.9712	C ₁₁₀	1.1733
C ₁₅	-1.4052	C ₄₇	-1.3003	C ₇₉	-1.3763	C ₁₁₁	1.4711
C ₁₆	-0.8439	C ₄₈	-0.3397	C ₈₀	-0.6360	C ₁₁₂	0.4881
C ₁₇	-1.5992	C ₄₉	-1.1051	C ₈₁	-1.2947	C ₁₁₃	0.7528
C ₁₈	1.1975	C ₅₀	1.2400	C ₈₂	1.6436	C ₁₁₄	-0.6417
C ₁₉	-1.9525	C ₅₁	-1.3975	C ₈₃	-1.6564	C ₁₁₅	1.0363
C ₂₀	-1.5141	C ₅₂	-0.7467	C ₈₄	-1.1981	C ₁₁₆	0.8002
C ₂₁	0.7219	C ₅₃	0.2706	C ₈₅	0.8719	C ₁₁₇	-0.0077
C ₂₂	0.6982	C ₅₄	0.7294	C ₈₆	0.9992	C ₁₁₈	-0.2336
C ₂₃	1.2924	C ₅₅	0.7444	C ₈₇	1.4872	C ₁₁₉	-0.4653
C ₂₄	-0.9460	C ₅₆	-0.3970	C ₈₈	-0.4586	C ₁₂₀	0.6862

C ₂₅	-1.2407	C ₅₇	-1.0718	C ₈₉	-0.8404	C ₁₂₁	1.2716
C ₂₆	0.4572	C ₅₈	0.6646	C ₉₀	0.6982	C ₁₂₂	-0.8880
C ₂₇	-1.2151	C ₅₉	-1.1037	C ₉₁	-0.7959	C ₁₂₃	1.4011
C ₂₈	-0.9869	C ₆₀	-0.5716	C ₉₂	-0.5692	C ₁₂₄	0.9531
C ₂₉	1.2792	C ₆₁	0.9001	C ₉₃	1.3528	C ₁₂₅	-1.1210
C ₃₀	0.6882	C ₆₂	0.7317	C ₉₄	0.9536	C ₁₂₆	-0.9489
C ₃₁	1.2586	C ₆₃	0.9846	C ₉₅	1.1784	C ₁₂₇	-1.2566

37. The preamble of claim 33, wherein the processing comprises magnitude clipping, and

wherein the time domain sequence after the second domain conversion is specified as follows:

Sequence Element	Value	Sequence Element	Value	Sequence Element	Value	Sequence Element	Value
C ₀	1.1549	C ₃₂	-1.2385	C ₆₄	1.3095	C ₉₆	-1.0094
C ₁	1.0079	C ₃₃	-0.7883	C ₆₅	0.6675	C ₉₇	-0.7598
C ₂	0.7356	C ₃₄	-0.7954	C ₆₆	1.2587	C ₉₈	-1.0786
C ₃	-0.7434	C ₃₅	1.0874	C ₆₇	-0.9993	C ₉₉	0.6699
C ₄	-1.3930	C ₃₆	1.1491	C ₆₈	-1.0052	C ₁₀₀	0.9813
C ₅	1.2818	C ₃₇	-1.4780	C ₆₉	0.6601	C ₁₀₁	-0.5563
C ₆	-1.1033	C ₃₈	0.8870	C ₇₀	-1.0228	C ₁₀₂	1.0548
C ₇	-0.2523	C ₃₉	0.4694	C ₇₁	-0.7489	C ₁₀₃	0.8925
C ₈	-0.7905	C ₄₀	1.5066	C ₇₂	0.5086	C ₁₀₄	-1.3656
C ₉	-0.4261	C ₄₁	1.1266	C ₇₃	0.1563	C ₁₀₅	-0.8472
C ₁₀	-0.9390	C ₄₂	0.9935	C ₇₄	0.0673	C ₁₀₆	-1.3110
C ₁₁	0.4345	C ₄₃	-1.2462	C ₇₅	-0.8375	C ₁₀₇	1.1897
C ₁₂	0.4433	C ₄₄	-1.7869	C ₇₆	-1.0746	C ₁₀₈	1.5127
C ₁₃	-0.3076	C ₄₅	1.7462	C ₇₇	0.4454	C ₁₀₉	-0.7474
C ₁₄	0.5644	C ₄₆	-1.4881	C ₇₈	-0.7831	C ₁₁₀	1.4678
C ₁₅	0.2571	C ₄₇	-0.4090	C ₇₉	-0.3623	C ₁₁₁	1.0295
C ₁₆	-1.0030	C ₄₈	-1.4694	C ₈₀	-1.3658	C ₁₁₂	-0.9210
C ₁₇	-0.7820	C ₄₉	-0.7923	C ₈₁	-1.0854	C ₁₁₃	-0.4784
C ₁₈	-0.4064	C ₅₀	-1.4607	C ₈₂	-1.4923	C ₁₁₄	-0.5022
C ₁₉	0.9034	C ₅₁	-0.9113	C ₈₃	0.4233	C ₁₁₅	1.2153
C ₂₀	1.5406	C ₅₂	0.8454	C ₈₄	0.6741	C ₁₁₆	1.5783
C ₂₁	-1.4613	C ₅₃	-0.8866	C ₈₅	-1.0157	C ₁₁₇	-0.7718
C ₂₂	1.2745	C ₅₄	0.8852	C ₈₆	0.8304	C ₁₁₈	1.2384
C ₂₃	0.3715	C ₅₅	0.4918	C ₈₇	0.4878	C ₁₁₉	0.6695
C ₂₄	1.8134	C ₅₆	-0.6096	C ₈₈	-1.4992	C ₁₂₀	0.8821
C ₂₅	0.9438	C ₅₇	-0.4321	C ₈₉	-1.1884	C ₁₂₁	0.7807
C ₂₆	1.3130	C ₅₈	-0.1327	C ₉₀	-1.4008	C ₁₂₂	1.0537
C ₂₇	-1.3070	C ₅₉	0.4953	C ₉₁	0.7795	C ₁₂₃	-0.0791
C ₂₈	-1.3462	C ₆₀	0.9702	C ₉₂	1.2926	C ₁₂₄	-0.2845
C ₂₉	1.6868	C ₆₁	-0.8667	C ₉₃	-1.2049	C ₁₂₅	0.5790

C ₃₀	-1.2153	C ₆₂	0.6803	C ₉₄	1.2934	C ₁₂₆	-0.4664
C ₃₁	-0.6778	C ₆₃	-0.0244	C ₉₅	0.8123	C ₁₂₇	-0.1097

38. The preamble of claim 31, wherein the preamble can be transformed prior to use and stored in a memory.

39. A method for distinguishing multiple piconets, wherein each piconet transmits a preamble with a unique code sequence, the method comprising:
- determining the code sequence in the preamble; and
 - identifying the piconet based on the code sequence, wherein the code sequence maps onto a unique piconet identifier.
40. The method of claim 39, wherein the determining comprises extracting the code sequence used to create the preamble.
41. The method of claim 40, wherein the code sequence is a hierarchical code, wherein the code sequence can be created by spreading a first sequence with a second sequence, and wherein the extracting comprises:
- despreading the preamble with the second sequence; and
 - despreading an output of the first despreading with the first sequence.
42. The method of claim 41, wherein the first sequence is an M-length sequence, wherein the second sequence is an N-length sequence, and wherein the second despreading comprises despreading every N-th chip produced by the first despreading with the first sequence.
43. The method of claim 40, wherein the code sequence is a hierarchical code, wherein the code sequence can be created by spreading a first sequence with a second sequence, and wherein the extracting comprises:
- despreading the preamble with the first sequence; and
 - despreading an output of the first despreading with the second sequence.

44. The method of claim 43, wherein the first sequence is an M-length sequence, wherein the second sequence is an N-length sequence, and wherein the first despreading comprises despreading every N-th chip of the preamble with the first sequence.

45. The method of claim 39, wherein the identifying comprises using a look-up table indexed by the code sequence to find the source of the preamble.

46. The method of claim 39, wherein the identifying comprises searching a list of sources and their associated code sequences to find the source of the preamble.

47. A circuit to despread a hierarchical sequence made by spreading an M-length sequence with an N-length sequence, the circuit comprising:

a first despreaders coupled to a signal input, the first despreaders to despread a received signal provided by the signal input with a first sequence; and

a second despreaders coupled to an output of the first despreaders, the second despreaders to despread the output of the first despreaders with a second sequence.

48. The circuit of claim 47, wherein the first and second despreaders comprises:

a serially coupled chain of delay elements, wherein a first delay element is coupled to an input;

a plurality of multipliers, wherein each multiplier having a first input coupled to an output of one delay element and a second input coupled to a coefficient of the first sequence; and

a summation unit coupled to outputs of each multiplier, the summation unit to combine the outputs of each multiplier to produce a value.

49. The circuit of claim 48, wherein a first multiplier in the plurality of multipliers has a first input coupled to the input.

50. The circuit of claim 48, wherein the first sequence is the N-length sequence and the second sequence is the M-length sequence, and wherein the first despreaders has N-1 delay elements and N multipliers and the second despreaders has M-1 delay elements and M multipliers.

51. The circuit of claim 50, wherein the delay elements of the second despreaders have a delay of N and the delay elements of the first despreaders have unity delay.

52. The circuit of claim 48, wherein the first sequence is the M-length sequence and the second sequence is the N-length sequence, and wherein the first despreader has M-1 delay elements and M multipliers and the second despreader has N-1 delay elements and N multipliers.
53. The circuit of claim 52, wherein the delay elements of the first despreader have a delay of N and the delay elements of the second despreader have unity delay.
54. The circuit of claim 47, wherein the circuit is used in a wireless receiver.
55. The circuit of claim 54, wherein the wireless receiver is part of a wireless communications system wherein transmissions include a preamble that makes use of a hierarchical sequence.
56. The circuit of claim 55, wherein the wireless receiver is part of a wireless communications system using orthogonal frequency division multiplexing.
57. The circuit of claim 55, wherein the wireless receiver is part of a wireless communications system using time frequency interleaved, orthogonal frequency division multiplexing.